

MIL-T-63072 (AR)  
28 March 1977

17-37-17

## MILITARY SPECIFICATION

## THREAD, POLYESTER

This specification has been approved for use by the U.S. Army Armament Research and Development Command, and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 This specification covers a polyester thread for use in ammunition (see 6.1).

## 2. APPLICABLE DOCUMENTS

2.1 Issue of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

## SPECIFICATIONS

## FEDERAL

PPP-P-50 - Packaging and Packing of Thread  
for Domestic and Overseas Shipment  
V-T-285 - Thread, Polyester

## MILITARY

MIL-A-48078 - Ammunition, Standard Quality  
Assurance Provisions, General  
Specification for

## STANDARDS

## FEDERAL

FED Test Method Std. No. 191 - Textile Test  
Methods

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Command, Attn. DRDAR-QA, Dover, New Jersey 07801 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC: 8310

THIS DOCUMENT CONTAINS 12 PAGES.

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(Copies of specifications, standards, drawings and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM-D123 - Textile Materials, Definition of Terms Relating to

ASTM-D2257 - Extractable Matter in Yarns, Test for

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Penn. 19103).

#### THE COLOR ASSOCIATION OF THE UNITED STATES INC.

Department of Defense Standard Shades for Sewing Thread 1968

(Application for copies should be addressed to the Color Association of the United States, Inc., 200 Madison Avenue, New York, N.Y. 10016).

### 3. REQUIREMENTS

3.1 Material. The thread shall be made from continuous filament (polyethylene glycol terephthalate) polyester yarn.

3.1.1 Yarn. The yarn shall be bright, continuous multifilament polyester (polyethylene glycol terephthalate) having a specific gravity within the range of 1.36 to 1.40, when tested as specified in 4.5.1.2 (see 6.7).

3.2 Color. The color (shade) shall be as specified in the applicable end item specification or in the contract or order (see 6.2 and 6.4). Shade designations by letter (e.g. - Olive Drab S-1) and related cable numbers (e.g. - CA66022) refer to the DOD Standards Shades for Sewing Threads 1968 (see 2.2).

3.2.1 Matching. The shade of the end item thread, after removal of finish, when applicable, shall match the specified applicable shade standard (see 6.3) when tested as specified in 4.5.2.

3.3 Construction. The construction of the thread shall be of twisted, multiple cord (ply). Each of the individual plies shall be twisted initially with not less

than the number of turns per inch to be used in the final twist, and in the opposite direction to the final twist (see 3.4). The final plied twist shall not be less than the applicable minimum turns per inch (t.p.i.). The thread shall be unbonded, with a soft finish.

3.4 Twist direction. Unless otherwise specified (see 6.2), the direction of the final twist shall be "z" when tested as specified in 4.5.3.

3.5 Physical characteristics. The finished thread shall conform to the applicable requirements for the specified size, set forth in Table I when tested as specified in 4.5.4.

TABLE I  
TYPE I - TWISTED SOFT MULTIPLE CORD  
CLASS 1 (LOW ELONGATION)

Letter size	Plies	Final twist (t.p.i.) min	Length per pound (yards) min	Breaking strength (pounds) min	Elongation (percent) max.
B	2 or 3	7.0	8,500	4.3	25
SB	2	7.0	8,000	6.0	20
E	3	6.0	5,700	8.0	20

3.5.1 Maximum length per pound. The maximum length per pound of any stated size of thread shall be the specified minimum of the next finer size thread of the same type and number of plies. The maximum length per pound of the finest size of threads listed in Table I shall not be more than 12 1/2 percent above the minimum specified when determined as specified in 4.5.4.3.

3.5.2 Knots. The thread shall average not more than one thread knot per two ounces.

3.6 Finish. The thread shall have a minimum of 6.0 percent to a maximum of 9.0 percent silicone oil, 200 centistoke lubricant or finish applied to it. Testing shall be as specified in 4.5.5.

3.7 Put-Up. Unless otherwise specified (see 6.2), the thread shall be put up on a nominal weight per holder basis on single head plastic tubes or single head wooden spools (hereinafter referred to as holders) as specified in the contract (see 6.2 and 6.7). For single head wood holders the nominal net weight shall be 1 ounce and for single head plastic holders the nominal net weight shall be 4, 8 or 16 ounces as specified in contract. When put up on readymade lockstitch bobbins is specified, the style of bobbin and the length of thread therein shall be in accordance with the contract or order. The average weight per holder shall not be less than the specified nominal weight

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minus 3.0 percent tolerance, on a 10 holder basis. The thread shall be put up in continuous length per holder, and shall be so wound that each turn and layer is free from entanglement.

3.8 Identification marking. Except when commercial identification markings are specified in the invitation to bid, each holder except the ready made lockstitch bobbins shall have a label attached in such a manner as to remain in place and be clearly legible until all thread has been removed. In the case of ready made lockstitch bobbins, the label shall be put on the outside of the unit pack (gross pack). The label shall be printed with the information as specified below:

Stock Number  
Weight (net)  
Direction of twist  
Color  
Letter size and ply  
Nomenclature

3.9 First article inspection. This specification contains provisions for first article inspection. Requirements for the submission of first article samples by the contractor shall be as specified in the contract.

3.10 Workmanship. The finished thread shall conform to the quality established by this specification.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection and standard quality assurance provisions. Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

4.2 Classification of inspections. The following types of inspections shall be conducted on this item:

- a. First Article Inspection (see 4.3)
- b. Quality Conformance Inspection (see 4.4)

#### 4.3 First article inspection

4.3.1 Submission. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with provisions of 4.3.2. The first article sample shall consist of ten (10) units of thread and holder.

4.3.2 Inspection to be performed. The sample will be subjected by the Government to any or all of the examinations or tests specified in 4.5 of this specification.

4.3.3 Rejection. See MIL-A-48078.

#### 4.4 Quality conformance inspection

4.4.1 Inspection lot formation. Inspection lots shall comply with lot formation provisions of MIL-A-48078. In

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addition, inspection lots of polyester threads shall contain thread from not more than one lot from one manufacturer.

4.4.2 Examination. Unless otherwise specified in the Classification of Defects and test tables, sampling plans for major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II (See MIL-A-48078).

## CLASSIFICATION OF DEFECTS &amp; TESTS MIL-T-63072 (AR)

PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 1 OF 1		PARAGRAPH REFERENCE / INSPECTION METHOD
				AQL OR 100%	REQUIREMENT PARAGRAPH	
4.4.2.1	Thread, on Holders					DRAWING NUMBER NA NEXT HIGHER ASSEMBLY
<u>Critical</u>	None defined					
<u>Major</u>						
101.	Identification label missing, incorrect, incomplete, illegible or insecurely attached			0.40%	3.8	Visual/Manual
102.	Loose ply			0.40%	3.3	Visual/Manual
103.	Cut, tear, chafe or slip			0.40%	3.3	Visual
<u>Minor</u>						
201.	Color uneven or other than specified			1.0%	3.2	Visual
202.	Dirt, spot or stain clearly noticeable			0.65%	3.10	Visual
203.	Finish uneven, lumpy, bare of thin spots or other than specified			0.65%	3.10	Visual
NOTES:						

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**CLASSIFICATION OF DEFECTS & TESTS**      **MIL-T-63072 (AR)**

PARAGRAPH	TITLE	SHEET 1 OF 1		NO. OF SAMPLE UNITS	EXAMINATION OR TEST	AQL OR 100%	REQUIREMENT PARAGRAPH	DRAWING NUMBER	
								NA	NEXT HIGHER ASSEMBLY
4.4.2.2	Thread, as unwound from holder								
CATEGORY									
<u>Critical</u>	None defined								
<u>Major</u>									
101.	Thread, not in continuous lengths	0.40%				0.40%	3.1.1	Visual	
102.	Incorrect construction	0.40%				0.40%	3.3	Visual	
103.	Average of more than one thread knot per two ounces (applicable to E and finer thread)								
104.	Thread, improperly or not firmly wound	0.40%				0.40%	3.5.2	Visual/Scale	
105.	Strands adhere to each other or holder	0.65%				0.65%	3.7	Visual/Manual	
106.	Thread not free from entanglement	0.40%				0.40%	3.7	Manual	
<u>Minor</u>									
201.	Evidence of poor workmanship	0.65%				0.65%	3.10	Visual	
202.	Thread not bright	1.0%				1.0%	3.1.1 (see notes)	Visual	

NOTES:

"Brightness" of thread is defined in ASTM-D123.

## CLASSIFICATION OF DEFECTS &amp; TESTS MIL-T-63072 (AR)

PARAGRAPH	TITLE	SHEET 1 OF 1		DRAWING NUMBER		
		EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.3	Holder or lockstitch bobbins					NA NEXT HIGHER ASSEMBLY
CATEGORY						
<u>Critical</u>	None defined					
<u>Major</u>						
101.	Incorrect average weight per holder			0.40%	3.7	Balance or Scale
<u>Minor</u>	None defined					
NOTES:						

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#### 4.4.3 Testing

4.4.3.1 Sampling of polyester thread. The sampling for the polyester threads, for the applicable tests specified in Table II, shall be in accordance with MIL-STD-105, Inspection Level S-2 using an AQL of 4.0 percent for each Major defect and 6.5 percent for each Minor defect. The sample unit shall be one holder or sufficient holders to provide enough thread for the applicable tests. The lot size shall be expressed in units of one holder, or gross of ready-wound bobbins. The lot shall be rejected if the Major or Minor defects that are allowed in the sample, are exceeded.

TABLE II

<u>Inspection/Requirement</u>	<u>Defect Classification</u>	<u>Test Paragraph</u>
Polyester yarn:		4.5.1
Identification		
(see 3.1.1.)	Major	4.5.1.1
Specific gravity		
(see 3.1.1)	Major	4.5.1.2
Matching - shade		
(see 3.2.1)	Minor	4.5.2
Twist, Direction of		
Initial (see 3.4)	Major	4.5.3
Final (see 3.4)	Major	4.5.3
Physical Characteristics		
(see 3.5)		4.5.4
Final twist	Major	4.5.4.1
Number of plies	Major	4.5.4.2
Length per pound	Major	4.5.4.3
Breaking strength	Major	4.5.4.4
Elongation	Major	4.5.4.5
Maximum length per pound (see 3.5.1)	Major	4.5.4.3
Percentage of silicone oil, lubricant or finish (see 3.6)	Major	4.5.5

4.4.4 Inspection equipment. The government reserves the right to inspect the contractor's equipment and determine that he has available and utilizes correctly, measuring and test equipment of the required accuracy and precision and that the instruments are of the proper type and range to make measurements of the required accuracy. Commercial inspection equipment shall be employed where applicable for all tests and examinations specified in 4.5. The contractor is responsible for assuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes (see 6.5).

#### 4.5 Test methods and procedures (see 6.6).

##### 4.5.1 Polyester yarn

4.5.1.1 Identification. The identification of the polyester yarn shall be determined in accordance with method 1600 of FED-STD-191.

4.5.1.2 Specific gravity. The specific gravity of the polyester yarn shall be determined in accordance with method 1600 of FED-STD-191.

4.5.2 Matching shade. The matching shade shall be determined in accordance with method 9010 of FED-STD-191.

4.5.3 Direction of twist. The initial and final direction of twist shall be determined in accordance with method 4050 of FED-STD-191.

##### 4.5.4 Determination of physical characteristics

4.5.4.1 Final twist. The final twist of the specimens shall be determined in accordance with method 4054 of FED-STD-191. The test for twist per inch (t.p.i.) in the individual cords (strands) shall be in conjunction with that for the final twist. After recording the final twist, and while the individual cords (strands) are straight between the jaws, all cords but one shall be cut out and removed. The clamp shall then be opened, the slack drawn through and the strand reset under the specified tension. The counter shall be reset to zero. The jaw shall then be rotated until all twist has been removed as determined by free passage of the needle between filaments. The t.p.i. shall be calculated in the general procedure of method 4054.

4.5.4.2 Number of plies. The specimens shall be visually examined, using daylight illumination, for compliance with the applicable requirement.

4.5.4.3 Length per pound. The length per pound of the specimens shall be determined in accordance with method 4010 of FED-STD-191.

4.5.4.4 Breaking strength. The breaking strength of the specimens shall be determined in accordance with method 4100 of FED-STD-191. For each sample unit, five (5) determinations shall be made.

4.5.4.5 Elongation. The elongation of the specimens shall be determined in accordance with method 4100 of FED-STD-191.

4.5.5 Composition of silicone oil, lubricant or finish. The composition of silicone oil, lubricant or finish for the specimens shall be determined in accordance with ASTM-D2257. The solvent used in this determination shall be methylene chloride.

#### 5. PREPARATION FOR DELIVERY

5.1 Put-up and packaging. Put-up and packaging shall be level A, B, or C as specified (see 6.2).

5.1.1 Levels A, B and C. The threads shall be put-up as specified in 3.7 and shall be packaged in accordance with the applicable requirements of PPP-P-50.

5.2 Packing. Packing shall be level A, B or C as specified (see 6.2).

5.2.1 Levels A, B and C. The thread shall be packed in accordance with the applicable requirements of PPP-P-50.

5.3 Marking. In addition to any special markings required by the contract or order, shipments shall be marked in accordance with applicable provisions of PPP-P-50.

## 6. NOTES

6.1 Intended use. The threads covered by this specification are intended for use in sewing propellant bags.

6.2 Ordering data. See MIL-A-48078. Procurement documents should also specify:

- a. Color (shade) required (see 3.2)
- b. Direction of twist, if other than specified (see 3.4)
- c. Letter size, or thread required (see 3.5, Table I)
- d. Put-up required (see 3.7) Reference: Federal Specification V-T-285D
- e. Type of holder (plastic or wood) required for thread.

6.3 Standard sample. For military shades, the standards for shade reference are those contained in the Standard Color Card for the Department of Defense Standard Shades for Sewing Thread (see 2.2). For other shades, address the procuring office issuing the invitation for bids or request for proposal. Standard samples frequently used by the military (directly or for components of end items), have been made available to normal suppliers as basic reference for the establishment of the supplier's secondary standards conforming to the characteristics of the official standards. The basic shades are those appearing in the DOD Color Card. Prime thread manufacturers who inadvertently have not been furnished standards for establishment of their colorfastness standards in accordance with this specification may obtain samples for this purpose from the U.S. Army Natick Research and Development Command, Natick, Maryland 01760, (ATTN: BRXNM-VTC).

6.3.1 In cases where it is not considered feasible to remove the finish prior to shade matching, the thread may be evaluated on an "as is" basis, upon approval of the contracting officer.

6.4 Dye formulations. The following combinations of dyes are suggested, but not mandatory, for the indicated shades:

Olive Drab, Shade S-1, C.A. 66022  
Disperse Blue 27  
Disperse Red 59  
Disperse Yellow 23

Black, Shade AA, C.A. 66043  
Disperse Black, C.A. 11365

Light Green, Shade Y, C.A. 66042  
Disperse Blue 64  
Disperse Blue 60  
Disperse Yellow 23  
Disperse Red 59

6.5 Submission of inspection equipment designs for approval. See MIL-A-48078. Submit equipment designs for major defects, to Commander, U.S. Army Armament Research and Development Command, ATTN: DRDAR-QAR-I, Dover, New Jersey 07801.

6.6 Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted through the Contracting Office to: Commander, U.S. Army Armament Research and Development Command, ATTN: DRDAR-QAR-R, Dover, New Jersey 07801. This description should include but not be limited to the procedures used, the accuracy and precision of the method, test data to demonstrate the accuracy and precision and drawings of any special equipment required.

6.7 Unless otherwise specified, certificates of compliance shall be submitted for the yarn and the holder.

Custodian:  
Army-AR

Preparing Activity:  
Army-AR

Project Number: 8310-A-108